

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced



CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

312/01

BIOLOGY

MODULE BI2

A.M. MONDAY, 10 January 2005

(1 hour 30 minutes)

For Examiner's Use Only

Total Marks	
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INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of the page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. (a) What kind of living organisms have the highest surface area to volume ratios? [1]

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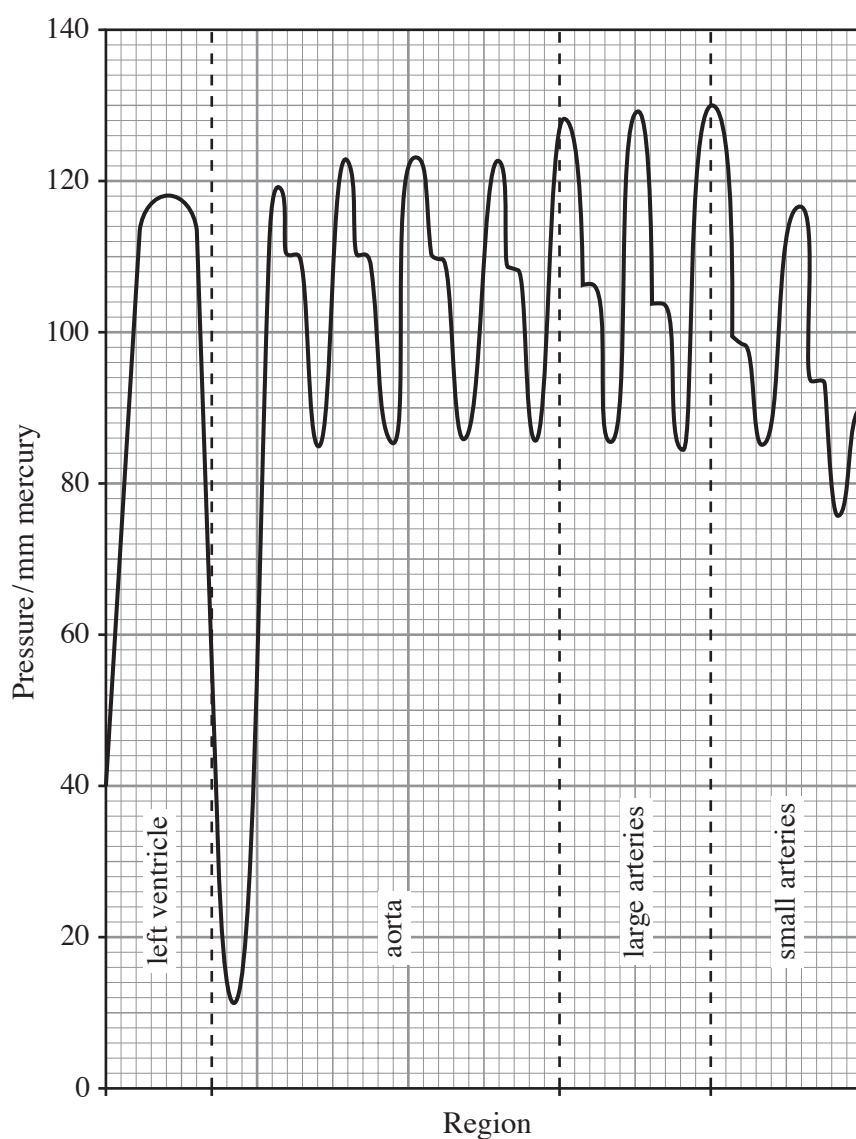
- (b) Apart from surface area, give **two** features of gaseous exchange surfaces. [2]

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.....

(Total 3 marks)

2. The diagram shows pressure changes recorded as blood flows through the heart and the arteries.



- (a) What is the value of the systolic pressure in the left ventricle? [1]

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- (b) Fluids flow from regions of high pressure to regions of low pressure. The minimum pressure in the ventricle is lower than the minimum pressure in the aorta. Explain why blood does not flow back into the ventricle from the aorta. [2]

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- (c) Explain what causes the left ventricle pressure to fall to a very low value. [2]

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.....

- (d) If the diagram had been extended to include the flow through the capillaries in the body, give **two** ways in which the trace would differ from the diagram given. [2]

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- (e) (i) Give **one** reason why the pressure in veins is lower than in capillaries. [1]

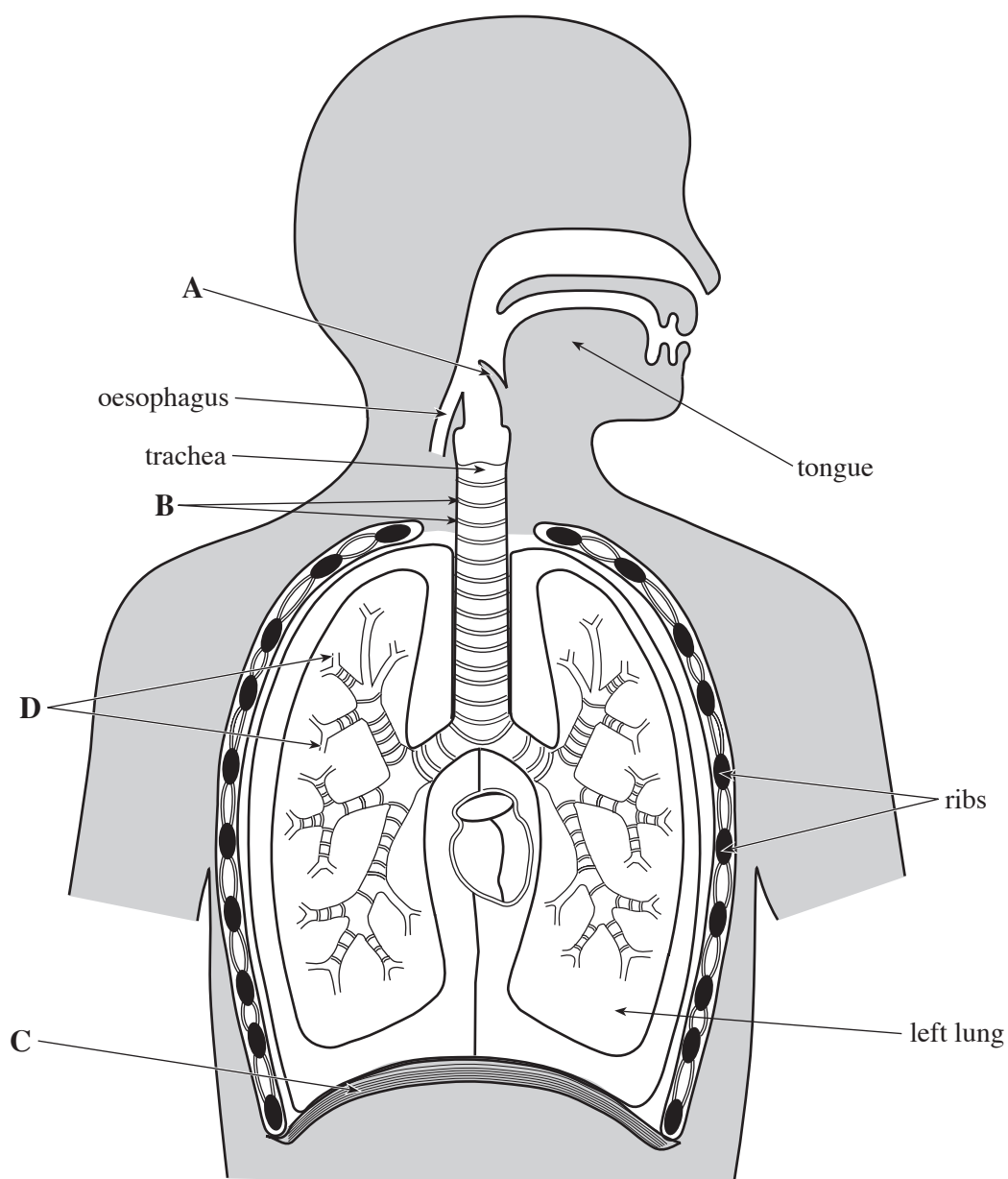
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- (ii) How is flow maintained at this low venous pressure? [1]

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(Total 9 marks)

3. The diagram below, shows the head and thorax with the ribs removed.



- (a) (i) Name the structures labelled A, B, C, and D.

[4]

A
B
C
D

(ii) Explain the functions of structures **A**, **B** and **C**.

[3]

A

.....

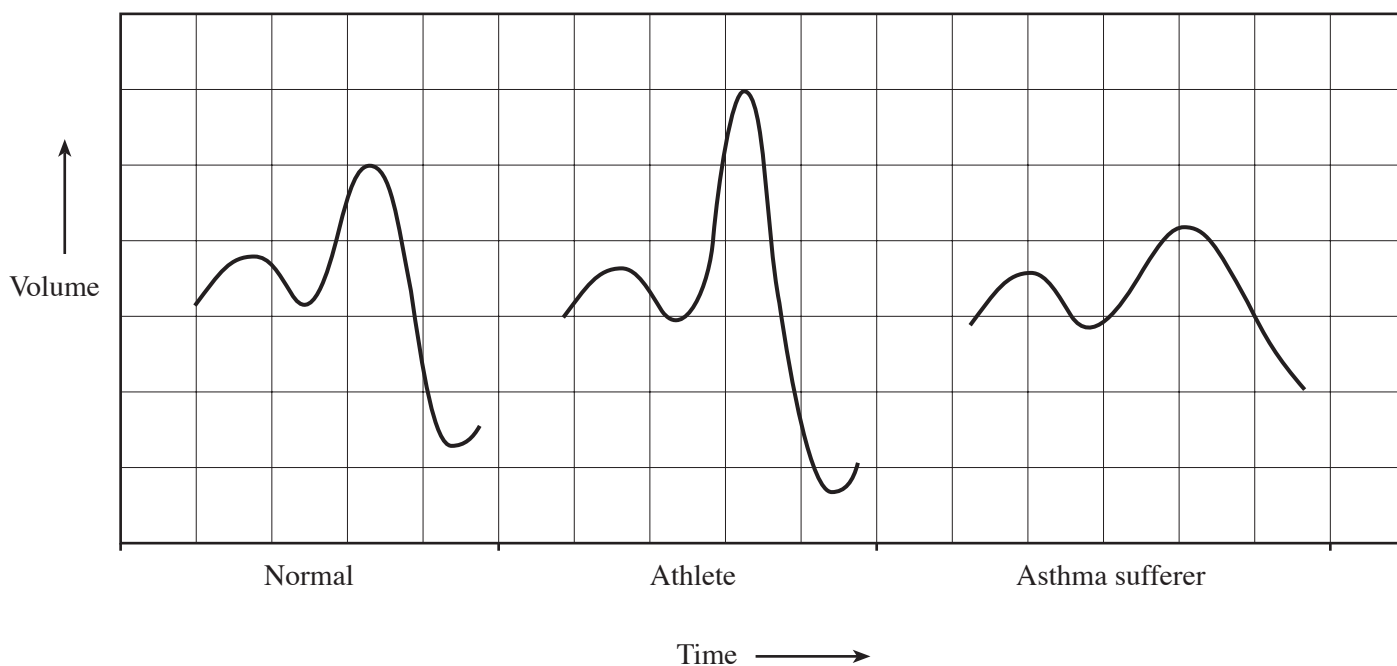
B

.....

C

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(b) The diagram below compares a normal spirometer trace with one from a trained athlete and one from an asthma sufferer.



(i) What feature shows the effect of training on the trace obtained from the athlete? [1]

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(ii) What **additional** feature distinguishes the asthma sufferer's trace from the other traces? [1]

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(iii) Explain the cause of this feature of the asthma sufferer's trace. [1]

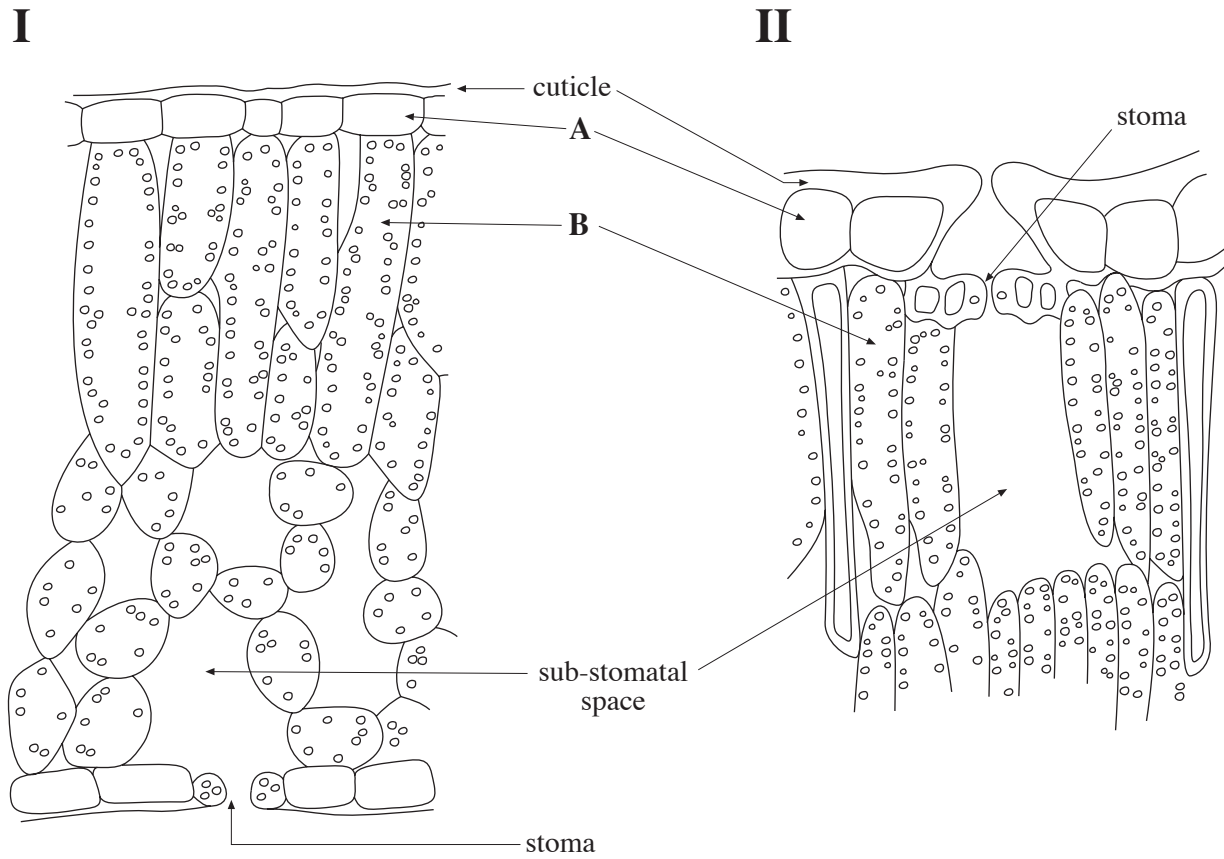
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(Total 10 marks)

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4. The diagrams show sections through the leaves of two different plants, labelled **I** and **II**.



- (a) Name the cells labelled **A** and **B**.

[2]

A

B

- (b) (i) Suggest which of these leaves has a lower rate of transpiration.

[1]

.....

- (ii) Give **two** features, shown in the diagrams, which support your choice.

[2]

.....

.....

.....

- (c) Suggest which leaf is likely to have the greatest surface area to volume ratio. [1]

.....

- (d) (i) Describe how you would expect the rate of transpiration in a typical leaf to change over a 24 hour period. [3]

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- (ii) Give an explanation for the opening and closing of stomata which bring about these changes. [3]

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- (iii) Give **one other** factor that might contribute to these daily changes in transpiration rate. [1]

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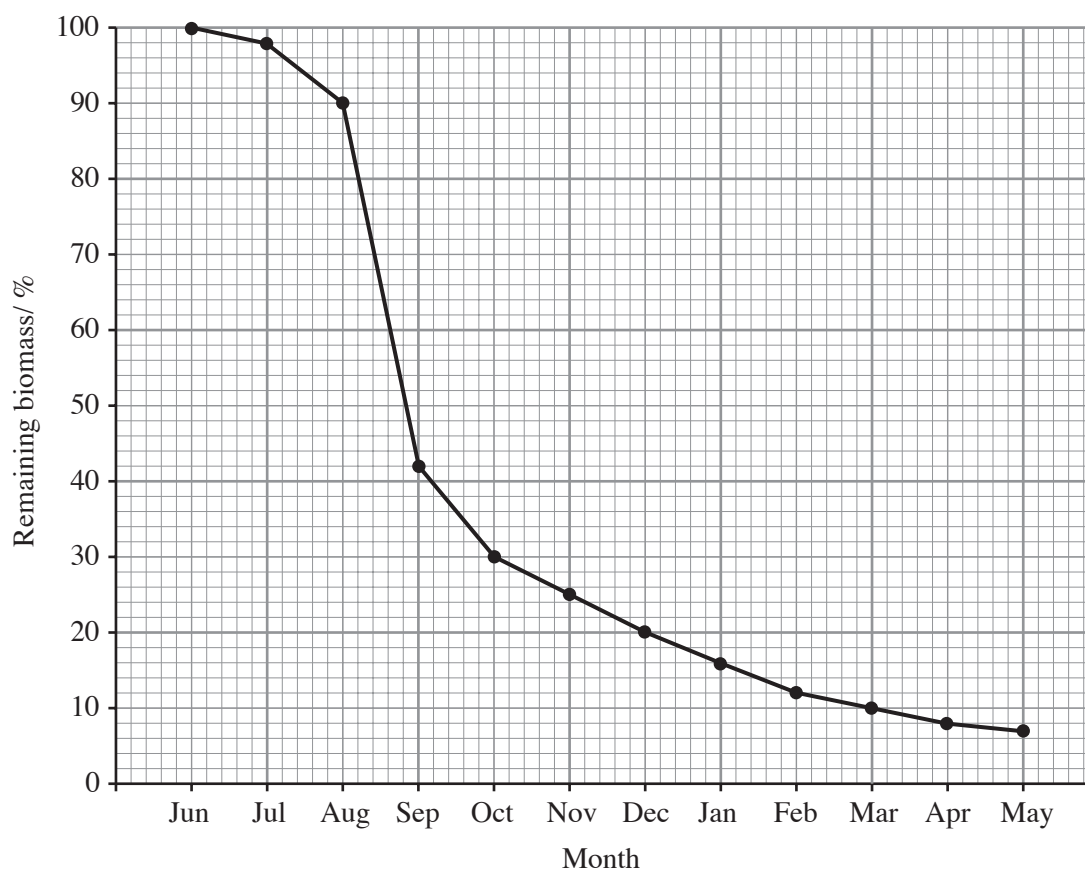
(Total 13 marks)

5. The disappearance of leaves in the litter layer beneath woodland trees was measured as follows.

Mesh bags, each containing fifty leaves, were buried in the litter layer in June.

Then a sample of bags was removed every month and the biomass of leaves in each bag was measured.

The mean values for the disappearance of leaf material over the year following the start of the experiment is shown in the graph.



- (a) Suggest why there was so little change in biomass during the first month. [1]

- (b) Suggest explanations for the shape of the curve:

- (i) from August to October; [1]

- (ii) from October to March. [1]

- (c) At the start of the experiment the mean nitrogen content of the leaves was shown to be 0.6 g/leaf. Calculate how many grams of nitrogen were lost from a bag from August to October. [2]

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- (d) What name is given to fungi that are involved in the breakdown of leaf litter? [1]

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- (e) (i) Name the chemical in the soil that is the end product of bacterial breakdown of nitrogenous compounds. [1]

.....

- (ii) Explain how the nitrogen in this chemical becomes available for plant growth. [2]

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- (iii) Some of the available nitrogenous compounds in the soil are lost instead of being taken up by plants. Give **two** ways in which this loss may occur. [2]

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- (f) The experiment was repeated in the marshy soil beside a lake, in the woodland. Explain how the result might differ. [3]

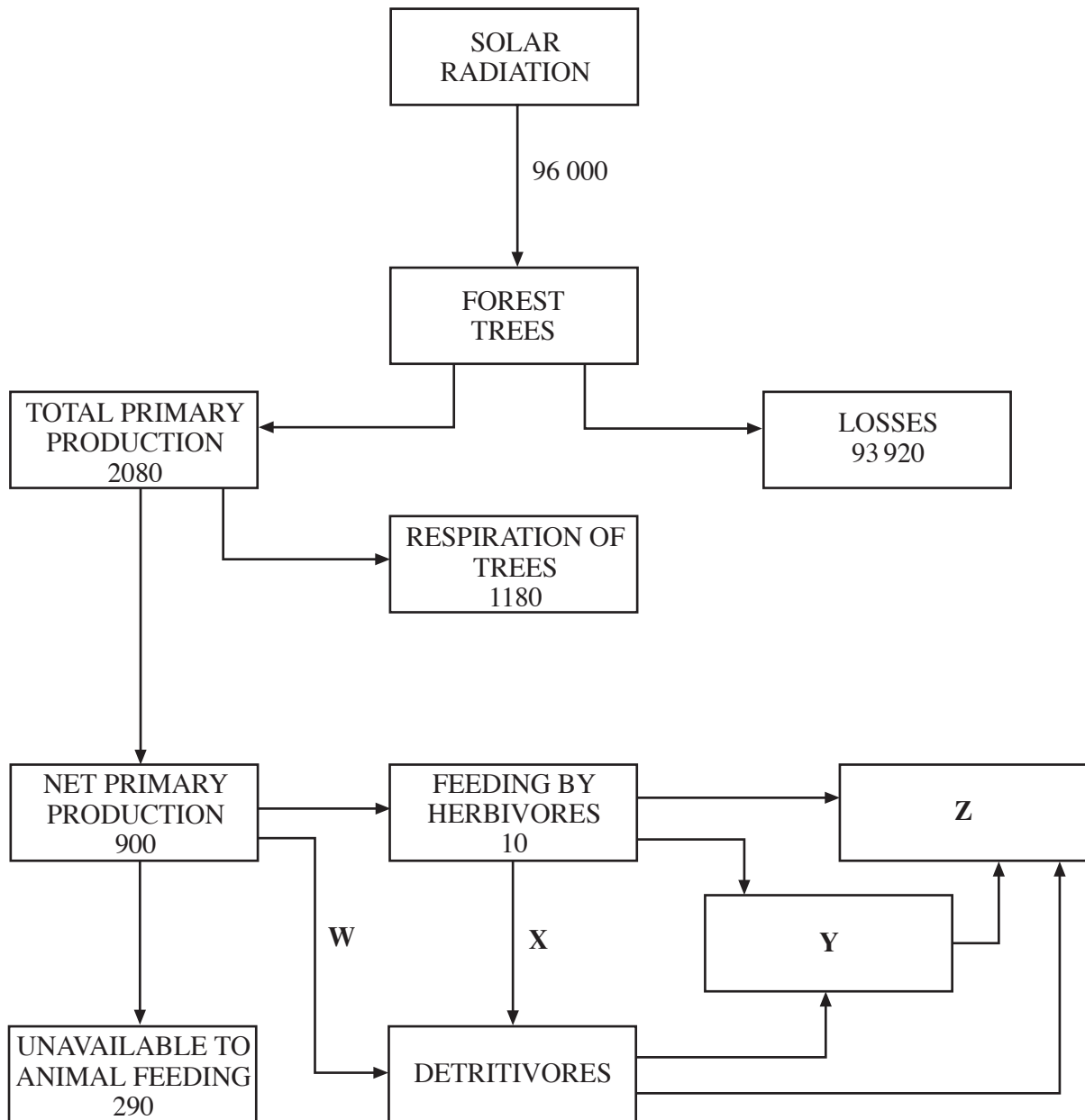
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(Total 14 marks)

6. The diagram below represents the flow of energy through a deciduous forest ecosystem. The values quoted are in kilojoules per square metre per year ($\text{kJ m}^{-2} \text{yr}^{-1}$.)



(a) Most of the net primary production passes to the detritivores by the routes labelled **W** and **X**.

(i) Give **two** processes represented by **X**. [2]

.....
.....

(ii) Which of the two routes, **W** or **X**, provides most energy for the detritivores?
Explain how you arrived at your answer. [2]

.....
.....
.....

(b) (i) The trees fail to convert $93\,920\text{ kJ m}^{-2}\text{ yr}^{-1}$ into primary production. Give one example of how these 'losses' occur. [1]

.....

(ii) Explain why $290\text{ kJ m}^{-2}\text{ yr}^{-1}$ is unavailable to animal grazers. [1]

.....

(c) What is represented by

(i) organism **Y**; [1]

.....

(ii) process **Z**. [1]

.....

(iii) In the diagram, would box **Y** or box **Z** contain the highest energy value? [1]

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(d) Calculate the percentage of the net primary production that is consumed by herbivores. [1]

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(e) What is the final form of energy after it has completed its passage through this system? [1]

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(Total 11 marks)

Any diagrams included in your answer must be fully annotated.

(ii) Discuss the transport of materials within the phloem. [6]

(ii) Indicate, with examples, how human activities can cause instability in populations. [4]

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